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*Ethnic Heterogeneity, District Magnitude, and the Number of Parties**

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Recent events leading to the importation of democratic ideas and ideals by previously totalitarian states increase our interest in the ways in which electoral institutions influence party systems. However, even if we restrict our attention to Eastern Europe or the successor states of the Soviet empire, we encounter a range of social diversity—ethnic heterogeneity—that is as great as those in the set of countries examined in earlier studies that seek to identify the influence of electoral laws (see Rae, Lijphart, and Taagepera and Shugart). Curiously, though, these earlier studies fail to ascertain whether and to what extent electoral laws mediate the influence of this heterogeneity. Hence, to develop a more pragmatic understanding of electoral institutions, we adopt the view of electoral laws as intervening structures, and using the data of these earlier analyses, we reconsider the role of one institutional parameter—district magnitude—that some researchers regard as the most important characteristic of an electoral system. Aside from the usual caveats about the limitations of our data, our primary conclusion is that district magnitude is not merely an important determinant of the number of parties that compete in a political system, but that it can offset the tendency of parties to multiply in heterogeneous societies.

The analysis of political institutions presumes that those institutions mediate between individual preferences and outcomes such as political stability and the nature and number of political parties. We also know that preferences have, as one source, society's underlying social structure, especially its ethnic structure. So in learning the influence of institutions on outcomes, we should consider the possibility that similar institutions in different social contexts yield different outcomes. Restated specifically for electoral politics, "the relationship between electoral rules and party systems is not mechanical and automatic: A particular electoral regime does not necessarily produce a particular party system; it merely exerts pressure in the direction of this system" (Duverger 1959, 40).

This argument, though, is not always made part of our research. Lijphart's (1990) reassessment of Rae's (1971) seminal analysis of electoral laws is a case in point. Despite acknowledging that "there are other

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important causes of multipartism, particularly the number and depth of cleavages in a society" (1990, 488), Lijphart's reanalysis, like Rae's, fails to consider Duverger's argument in its full form. The particular problem is that the "usual suspects" examined in these studies, stable democracies, vary greatly in character (compare an ethnically heterogeneous United States with a population of 250 million to homogeneous states such as Iceland and Luxembourg whose *combined* population fails to exceed that of metropolitan Tulsa). Analyzing the effects of electoral institutions separate from other things ignores the possibility that institutions are intervening structures and that they influence, say, the number of political parties only to the extent that the "more basic" characteristics of a society act through them to increase or decrease this number.

In this essay, then, we adopt the view of electoral laws as intervening structures, and we reconsider Rae's (1971) and Lijphart's (1977, 1984, 1990) analyses of the institutional parameter—district magnitude—that researchers (see Taagepera and Shugart 1989) regard as the most important characteristic of an electoral system. In section 1 we reconsider the data and some of the variables that are the focus of earlier studies, and in section 2 we discuss an especially important component of social structure—ethnic heterogeneity—that sets the context for the operation of electoral institutions in general and district magnitude in particular. In section 3 we reanalyze matters using Lijphart's approach, whereas in section 4 we consider Rae's election-by-election method. In section 5 we use both Rae's and Lijphart's approaches to assess the extent to which our conclusions about the joint influence of district magnitude and ethnic heterogeneity depend on the inclusion in the data set of single-member district systems, and in section 6 we offer some concluding remarks.

1. Data and Variables

The Unit of Analysis

Lijphart (1990) criticizes Rae's (1967) election-by-election approach with the argument that a political system such as the United States, operating under a uniform electoral arrangement throughout this century, ought to be treated as a single observation. Entering all data from the United States along with data from the three French elections held under d'Hondt in 1945 and 1946 biases the analysis in the direction of the consequences of electoral laws as they appear in the United States. So after defining an electoral regime to be a period of time in a country in which electoral rules—the seat allocation formula and the average number of seats to be filled in an electoral district (district magnitude)—are essentially constant, Lijphart takes regimes as the unit of analysis. The values

of other variables, such as the number of parties, are then set equal to their average across all elections within the regime.

Lijphart's (1990) argument has at least one theoretically compelling justification that is consistent with his argument for this modification ("elections under the same rules are not really independent cases but merely repeated operations of the same electoral system," 482). Specifically, the usual hypotheses about the relationships between the number of parties and electoral laws concern the properties of systems in equilibrium.[1] Indeed, it is here that we find the justification for excluding data from "unstable" democracies. Hence, an empirical assessment of those hypotheses ought to focus on dependent variables such as "the equilibrium number of parties within a system," and averaging across all elections in a regime moves us closer to this ideal.

However, even if we restrict our attention to stable Western democracies, this approach can be criticized. First, it introduces a bias that is opposite Rae's because the data includes regimes containing a single election. Thus, Lijphart equates the weight of the first postwar (and presumably out-of-equilibrium) French and German elections to all postwar elections held in, for instance, Canada, the United States, or Australia. Second, although we may predict that a change in electoral law will change the number or strengths of parties, it is not the case that we predict that these changes are instantaneous. Hence, the results of an election immediately following a change may tell us little about the consequences of that change. Third, averaging values of variables within a regime and taking these averages as the observations introduces a number of econometric problems, including artificially increasing R^2 and t-statistics.

There is no wholly satisfactory methodology, since there is no way to learn the "true" equilibrium number of parties in a regime that encompasses, say, two or three elections. Minimally, though, we can do two things. First, we can discard all one-election regimes (Sweden in 1948, Germany in 1949 and 1953, and Israel in 1949). Second, we can set all variables equal to their values in the last election of each regime. But because this approach can be criticized as well (in addition to "wasting" the data from all but the last election of a regime, if changes in electoral laws are endogenous, this last election might actually be an out-of-equilibrium event that signals change), we also consider Rae's original

[1]We refer here to the spatial modeling literature (see Enelow and Hinich 1984) and to the literature on the equilibrium number of parties, beginning with Duverger (1954) through Cox (1984), Palfrey (1989), and Fedderson, Sened, and Wright (1990).

approach and Lijphart's. In this way, we assess the extent to which our conclusions depend on our handling of the data.

These adjustments in the treatment of the data bear upon another issue—the endogeneity of electoral laws. First, we should not be surprised to learn that specific institutional arrangements are chosen because they make life more secure for existing parties and political elites. For example, if single-member districting reduces the incentives of parties to fracture in a multiethnic environment, then a system that begins somehow with a small number of parties will maintain and even strengthen that system in the face of increasing heterogeneity to the extent that political elites have control over the rules of a game in which they are successful players. Similarly, if a multiparty system experiences some exogenous shock that threatens to disrupt party structures, then whether that shock changes party structures or whether, through the actions of elites, it results in the change of electoral laws in a way that maintains the status quo will depend on things that we cannot specify here (Shamir 1985).

Ideally, we prefer to test a theory that specifies $[D^*(H), N^*(H)]$, where $D^*(H)$ is the equilibrium district magnitude (or any other parameter of an electoral system under investigation) implied by the equilibrium number of parties; $N^*(H)$, where $N^*(H)$ is a number implied by $D^*(H)$; and where H summarizes the permanent characteristics of a society (e.g., ethnic heterogeneity) that influences the relationship between D^* and N^*. Unfortunately, aside from those models that establish [1, 2] and [2, 2] as equilibria under plurality rule (Palfrey 1989; Fedderson, Sened, and Wright 1990; Cox 1984), we can offer only "reasonable arguments" that N^* increases as D^* increases. Thus, our analysis, like Rae's and Lijphart's, implicitly assumes that observed values of D correspond to equilibrium values and that changes in D are due to exogenous factors.

Counting Parties

Although he considers several alternatives, Rae's primary dependent variable is party fractionalization, F, based on the Herfindal-Hirschman index and applied to national election returns for the lower house of parliament or legislature. Lijphart (1990) and Taagepera and Shugart (1989) calculate the "effective number of parties" by computing $1/(1 - F)$.

The use of this and similar indices stems from the belief that the analyst should not give equal weight to parties that receive, say, 60% versus 5% of the vote. The problem with any fractionalization index, though, is that it obscures the motives and actions of voters and political elites so that it becomes difficult or impossible to discern the effect of institutional structure on these separate motives. For example, suppose that whatever theory we possess predicts (for a given institutional

structure and distribution of preferences over policies) that four parties will compete and that each will receive, in equilibrium, an approximately equal vote share. Fractionalization indices would then measure the extent to which some parties are less than "full fledged" owing to differences in, say, organizational talent. On the other hand, suppose, for some other set of issue preferences, we predict that these four parties continue to compete but that they secure unequal vote shares in equilibrium. A fractionalization index, applied in combination with the observed actual number of parties, may then provide the appropriate measure of the extent to which voter choice matches theoretical expectations. In this instance, if our theory focuses on the incentives of political elites to form and to maintain parties or if it seeks to uncover the interaction of voter and elite motives, then such an index, if used alone, confuses matters by reporting a number less than four or even three.

This problem is like counting the number of breakfast cereals on the market. One approach is to proceed to the local supermarket and count; another approach is to compute a fractionalization index using market share data. Which number is correct? If we are interested in learning something about consumer tastes, then a measure of fractionalization may be of some value. But if we seek to gauge the extent to which the cereal market responds to variations in consumer taste or if we wish to compare the responsiveness of this market to others, then simple counts are more appropriate, along with independent measures of tastes. Similarly, unless we assume that all parties gain equal vote shares in equilibrium, application of a fractionalization index can mislead us about the incentives to organize parties.

In addition, then, to employing "effective number of parties" as a dependent variable, we shall also simply count the number of formally organized parties that secure more than 1% of the national vote or one or more seats in the lower house of the legislature. A 1% cutoff is arbitrary, but it does take us part way toward eliminating "parties" that are mere ephemeral protest movements.[2] In addition, we count only those parties which satisfy this cutoff in two or more successive elections, which has the effect of eliminating those candidates or parties which may receive a significant proportion of the vote in one election but which do not sustain themselves as a separately organized party.

[2]A 1% cutoff reduces the extent to which our analysis depends on potential variations in the "other" category of vote tabulations. Note that this rule sometimes results in the number of parties with seats in parliament exceeding the number of parties receiving more than 1% of the vote.

Time Period

Although Rae and Lijphart restrict their attention to post–World War II elections, we should not suppose that the "laws" of electoral competition came into play only after 1945. Elections before World War I may have differed from what followed owing to changes in the franchise; but only because World War II lay in the future is 1918–39 distinct from the post–World War II period. We see no reason to suppose that the 1935 elections in Britain, for example, are a less valid observation than, say, the German elections of 1949. Consequently, we add the Continental elections in the interval 1918–39 to our data, along with all elections beginning with 1918 that occurred in those countries that held elections throughout the war.[3] However, when analyzing matters using Lijphart's approach, we assume that 1939–40 (or the prewar election closest to this date) marked the end of a regime for all countries regardless of the electoral formula that each employed after the war. Finally, we also add postwar election data from Greece, Spain, Portugal, and Japan.

District Magnitude

It is by now agreed in the comparative elections literature that *the* critical institutional variable influencing the formation and maintenance of parties is district magnitude—the number of legislative seats to be filled within an electoral district. The importance of magnitude derives, in part, from its influence on the vote quota a party must secure to ensure representation in parliament. Also, magnitude influences a system's proportionality, which also influences the incentives to form and maintain parties: "[district magnitude] affects the proportionality of PR more than do the various mathematical translation formulas . . . [and in] this regard the rule of thumb is that the smaller the district the lesser the proportionality and, conversely, the larger the district the greater the proportionality" (Sartori 1986, 53).

Unfortunately, characterizing each country by a single measure of magnitude is difficult. Few countries with proportional representation (PR) have multiple districts that are of uniform magnitude. Several countries also have at-large or adjustment seats designed to "correct for" the influence of district magnitudes and seat allocation formulas. The most extreme case is Germany, with 249 single-member districts and a single 249-member national "district." Owing to this variability, no single measure captures all relevant aspects of magnitude. Lijphart opts for a simple calculation based on average magnitude. But an average equates a

[3]Like Lijphart's election data, ours is in Maskie and Rose (1991).

country with N double-member districts to one that has $N/2$ single-member districts plus a single $N/2$-member "adjustment" or at-large district (e.g., Germany). These two situations do not yield equivalent incentives for party formation because each can yield a different vote share threshold that parties must meet before they secure legislative representation and because each generates different incentives for voters to vote strategically.

In response to this and similar problems, Lijphart, who uses a simple categorical analysis, accommodates adjustment or at-large seats by moving a country with a "significant" number of such seats into the next larger category of average magnitude. Taagepera and Shugart (1989) offer a more extensive analysis of "effective" magnitude and offer a formal adjustment that seeks to accommodate the fact that legal thresholds or adjustment seats can override the strategic imperatives of a simple average. A justification for their approach, though, requires that: (1) all parties are national; (2) overall variations in magnitude within a country are not great; and (3) the number of parties, N, is approximately equal to district magnitude plus one, $D + 1$. Assumptions (1) and (2) are also required to justify using average magnitude. Assumption (3), though, reveals that "effective magnitude" is itself an endogenously determined parameter that is a function, in part, of a variable we attempt to predict.

The essential problem, here, of course, is that the incentives to form and maintain parties are a complex function of national and district electoral laws, as well as of parliamentary structure. Hence, we know that except for the simplest systems, no single index or measure can summarize the imperatives of most existing electoral laws. Absent a theory that tells us how to convert a description of an electoral system so that we can enter that description into a statistical analysis, we shall focus on Rae's and Lijphart's calculations of magnitude based on averages. However, in appreciation of the issues they raise, we also examine Taagepera and Shugart's (1989) adjustment.[4] Comparing the performance of these two measures tells us that additional refinements of the calculation of magnitude are likely to be profitable.

Finally, Sartori (1986, 67, n. 15) argues reasonably that the relationship between proportionality and district magnitude and, by inference,

[4]We should comment on one variable we do not consider—disproportionality (as measured by the average of absolute discrepancies between each party's share of the vote and share of legislative seats). Employing measures of disproportionality based on actual election returns as an independent variable ignores the fact that the influence of disproportionality is already reflected in those returns to the extent that they influence voting patterns. Thus, no clean logical relationship can be established between such measures and this study's dependent variable—number of parties.

between number of parties and magnitude is curvilinear. That is, although we might predict that single-member districts imply two-party systems, and that, say, 15-member districts might allow four or five parties, it is unreasonable to suppose that 120- or 150-member districts (Israel and the Netherlands) will generate 30 or 40 parties, ceteris paribus. In regressions that we do not report here to save space, we note that in choosing between D and two alternative operationalizations of Sartori's argument—the natural log of D, $\ln(D)$, and $D^{1/2}$—$\ln(D)$ consistently performs best.[5] Hence, we focus on $\ln(D)$ exclusively.

2. Ethnic Heterogeneity

Measuring Heterogeneity

The study of political institutions assumes that outcomes derive from strategic choices based on preferences and taken as responses to institutional constraints. We have discussed constraints (district magnitude) and outcomes (number of political parties). Turning to preferences, we begin by noting that Taagepera and Shugart (1989) summarize Duverger's argument with a conclusion similar to ours, namely that "(1) Plurality rule tends to reduce the number of parties . . . , regardless of the number of issue dimensions. . . . (2) PR Rules tend not to reduce the number of parties, if the number of issue dimensions favors the existence of many parties" (65). However, the issue dimensions Taagepera and Shugart count, taken from Lijphart (1984), can be said to be endogenous to the political system. Since different electoral systems give political elites different incentives to entrepreneur issue salience, we cannot reject the supposition that Taagepera and Shugart's findings are due to the influence of electoral system on issues rather than the effect of issues on outcomes as mediated by electoral system.

What we require, then, is a measure of the exogenous determinants of those preferences that are relevant, a priori, to pressures to increase or decrease the number of political parties. In this respect, a key variable that is of evident contemporary concern is a society's ethnic heterogeneity. We need not review the innumerable essays that document the influence of ethnicity on politics. But keeping in mind those instances

[5]Notice that, since $\ln(1) = 0$, letting $L = \ln(D)$ in expression (2) is equivalent to assuming that heterogeneity is of no consequence in single-member district systems whereas using D and $D^{1/2}$ allows heterogeneity to "operate" there. Since $\ln(D)$ provides a considerably better fit than does any other way of entering district magnitude into the analysis, we can tentatively accept the hypothesis that single-member district systems suppress and even eliminate the potential divisive effects of ethnic heterogeneity (Horowitz 1990). Indeed, this finding is strong evidence in support of Taagepera and Shugart's subsequently cited restatement of Duverger's argument.

in which political engineering must contend with ethnicity and ethnic conflict when attempting to implement stable democratic systems (see Horowitz 1991), focusing on this characteristic of a society should help us ascertain how alternative electoral laws mediate the influence of ethnic heterogeneity.

There are, though, a number of issues that arise when incorporating ethnic heterogeneity into our analysis: its measurement and the structural form of its incorporation. First, with respect to measurement, we begin by reconsidering our discussion of fractionalization indices. Earlier, we argue against the application of such indices to election returns data because it confuses the interdependent motives and actions of voters and political elites. But social heterogeneity (with the possible exception of religion) is not a product of individual choice—rather, it is better portrayed as an exogenously determined social state. And an especially convenient characterization of heterogeneity is the probability that two randomly chosen individuals are of the same ethnic group. Hence, if there are valid arguments that such indices measure anything, then they apply to ethnicity.[6] Thus, one indicator of ethnic heterogeneity is simply ethnic fractionalization, F, where F varies between zero and one and denotes the ethnic (linguistic, religious) fractionalization of society (where one, the upper limit of fractionalization, is approached when every individual is a member of a different group).

Notice that F admits two measures that can be entered into a regression analysis: F itself, and $H = 1/(1 - F)$. This second variable, H, measures the "effective number of ethnic groups" in the same way as Lijphart calculates "effective number of parties" from Rae's fractionalization measure. However, in lieu of arguing whether F or H is more theoretically satisfying (we believe that H is the more appropriate calculation for the reasons that Lijphart and Taagepera and Shugart offer), we note simply that in regressions not reported in this essay, H uniformly provides better fits than does F.

Of course, as with most other things, no single index can serve as a wholly satisfactory measure of every aspect of social heterogeneity that we might think is relevant. For example, separate indices for ethnic, religious, and linguistic heterogeneity might be employed in recognition of the fact that ethnic heterogeneity is but one potential dimension of social cleavage. Although we focus on ethnicity because we have more confidence in its measurement and the resulting index of fractionaliza-

[6]See also Lijphart (1977)—especially the discussion and citations in n. 10, p. 59—and Rae and Taylor (1970) for additional discussion rationalizing the use of fractionalization indices in this context.

tion,[7] our problems do not end even if we employ separate indices (see n. 12 for consideration of religious and linguistic heterogeneity).

First, separate indices would not tell us whether these cleavages correlate. A society may have two ethnic and two religious groups but anywhere from two to four distinct ethnic-religious clusters. Second, a fractionalization index cannot measure the salience of these cleavages, which can be endogenous to electoral laws (Lijphart 1977; Rabushka and Shepsle 1972). Finally, a fractionalization index ignores the important matter of territoriality. The particular problem is that ethnic, religious, and linguistic heterogeneity can operate differently when groups are geographically separate than when all groups are mixed (see Horowitz 1985, 1991). Territoriality allows for a heterogeneous society but homogeneous election districts and thereby can influence the incentives of parties to compete within a district and nationally. Thus, although Switzerland and the United States are both ethnically heterogeneous, the relative absence of territorial considerations in the United States as compared to the situation in Switzerland suggests that even if both countries adopted identical electoral laws, heterogeneity and those laws would operate differently in each country.[8]

Specification of Functional Relationships

Even if we were to identify theoretically appropriate measures of all potentially relevant variables and their functional relationships, we would soon exhaust our degrees of freedom. There are many more potential permutations of social and institutional structures than would exist in any data set. But our purpose here is not to ascertain precisely how ethnic heterogeneity influences party systems. Rather, we merely want to determine whether the influence of a single institutional variable, district magnitude, on the number of political parties is better described if we take a simple characterization of society's ethnic structure into account, with the understanding that there is considerable room for additional refinements in the conceptualization and measurement of variables.

[7]The particular difficulty with language is that many people are multilingual, and thus, their classification can be arbitrary; similarly, religion poses the problem of how to classify those who either indicate no religious affiliation or classify themselves as agnostic or atheist.

[8]Territoriality also bears on the interactive influence of other institutional features that we do not consider, such as federal structure. A comparison of the United States, Switzerland, and Belgium, for example, should result in different conclusions about the role of heterogeneity. All three states are heterogeneous, but territoriality is relevant only in Switzerland and Belgium. Thus, although the degree of federal decentralization will influence the nature of electoral competition and party structures in Belgium and Switzerland, including the ultimate salience of ethnic or linguistic matters, its influence should be less in the United States.

So suppose that we have an index, H, that we take to measure the effective number of ethnic groups.[9] Our next question is how to enter this variable into the analysis. That is, if the number of political parties, N, is a function of H as well as of the log of district magnitude $\ln(D)$, then we must contemplate alternative functional forms. There are two primary choices. The first choice assumes that heterogeneity and $\ln(D)$ have independent effects modeled by the simple linear relationship

$$N = \alpha + \beta_1 \ln(D) + \beta_2 H. \tag{1}$$

This expression, then, is the implicit assumption of those essays that study electoral laws independent of social context or that study the effect of electoral laws alone (thereby implicitly relegating the influence of H to the error terms of their analyses).

The second possibility, implied by Lijphart's discussion of electoral laws (if not his empirical analysis of them) is the one that is more consonant with the hypothesis that heterogeneity's impact is mediated by electoral structure—or, equivalently, that the operation of electoral structure depends on fixed social preconditions:

$$N = \alpha + \beta H^* \ln(D). \tag{2}$$

This second expression, then, models Taagepera and Shugart's (1989, 65) revision of Duverger's hypothesis. However, rather than rely as they do on subjective counts of election issues—the salience of which are almost certainly endogenously determined—we operationalize H as a variable that cannot itself be influenced by electoral laws.

The final possibility, expression (3), combines these two models into one, which we consider for purposes of determining whether H or $\ln(D)$ has any independent effect on the number of parties after we have controlled for $H^*\ln(D)$.

$$N = \alpha + \beta_1 \ln(D) + \beta_2 H + \beta H^* \ln(D). \tag{3}$$

The analysis we report here ascertains which of these three functional forms best describes the data that are the focus of Rae's and Lijphart's research and whether incorporating ethnic heterogeneity into

[9]Ethnicity data for elections and regimes initiated prior to 1971 are taken from *Atlas Naradov Mira* (Moscow, 1962); for regimes and elections after 1970, we use data from *Narodi Mira: Istoriko Etnographitcheskii Spravochnik* (Moscow, 1988). Note that both sets of data are collected by the same institute using the same methodology and thus are comparable; the 1962 data were collected in 1960, whereas the 1988 data were collected in 1985. Religious and linguistic heterogeneity is computed using data from a single source: *Encyclopedia Britannica* (1980).

Table 1. Effective Number of Parties Using Lijphart's Data

	Regression Numbers				
	(1)	(2)	(3)	(4)	(5)
Constant	3.24	4.10	3.21	3.23	3.86
	(12.5)	(13.2)	(7.29)	(13.8)	(7.67)
ln(D)	.34	—	.35	—	−0.45
	(3.5)		(3.31)		(−1.42)
H	—	−.19	.01	—	−0.33
		(−.87)	(.07)		(−1.44)
H*ln(D)	—	—	—	.27	.55
				(4.43)	(2.84)
Adj. R^2	.17	.001	.14	.23	.22
SEE (mean)	.96	1.07	.98	.92	.93
	(3.86)				
N = 32					

Note: Throughout this essay, numbers in parentheses after estimated coefficients are t-statistics; numbers in parentheses after SEE are means of the sample's dependent variable.

Dependent variable = *ENPV*, Lijphart's data.

the analysis contributes anything to our understanding of the consequences of electoral laws.

3. Analysis: Lijphart's Regime Approach

Beginning with Lijphart's regime data, Table 1 presents a series of regressions in which the dependent variable is the "effective number of parties" based on each party's share of the vote (*ENPV*) as calculated by Lijphart. Clearly, none of the results this table reports are statistically spectacular, but notice first, from regression 1 an additive specification like expression (1) leads to the conclusion that the effective number of ethnic groups has no influence on *ENPV* and that ln(D) provides whatever explanatory power is available in the two independent variables this study considers.

The last two regressions in this table, though, show that this conclusion is erroneous. Specifically, the best overall fit is secured by assuming, in accordance with expression (2), that heterogeneity and district magnitude are interactive. Moreover, the comparison of regressions 4 and 5 shows that, at least when *ENPV* is our dependent variable, H*ln(D) wholly absorbs any independent effect that ln(D) or H alone might have on the effective number of political parties. Moreover, comparing

tion systems. Let us turn, then, to the measure suggested by Taagepera and Shugart (1989), which seeks to take more explicit account of vote thresholds that parties must exceed before securing legislative or parliamentary representation owing either to legally specified thresholds or to adjustment seats and at-large districts that move a system closer to proportionality.

Table 3 reproduces the regressions in Table 2, except that now we replace the calculation of D based on a simple average with Taagepera and Shugart's calculations of "effective magnitude," D_e. The comparison of Tables 2 and 3 shows that if we compute the *effective* number of parties based on either votes or seats, Taagepera and Shugart's measure does in fact perform better than does D, the simple average (equivalent results arise if we compare regressions run using expression (3) as our model). On the other hand, D provides a better fit if we simply count the number of parties. Since we have greater confidence in NV and NS as the theoretically correct dependent variable, we continue to use D in our reanalysis of Rae's approach in the next section. Nevertheless, Taagepera and Shugart's efforts at devising a more theoretically satisfying measure of district magnitude warrant closer attention because additional refinements may generate additional payoff. We want to emphasize, though, that it follows from Table 3 that our conclusion about the superiority of the interactive structure that models district magnitude as an intervening parameter does not depend on how we operationalize district magnitude.[11] Aside from the differences in goodness of fit just noted, the qualitative patterns among our estimated coefficients are identical to those we report in Table 2.

4. A Brief Reconsideration of Rae's Approach

Before putting a "seal of approval" on the interactive model, we must consider two additional matters. First, we should consider Rae's election-by-election data in order to be certain that our conclusions do not depend on definitions of a regime or on regimes that survive for only a few elections. Second, noting that countries with single-member district procedures, on average, are more heterogeneous than are those with PR systems, we want to be certain that it is not the non-PR countries (Australia, the United States, Britain, New Zealand, Canada, and France for all but one election after 1958) that provide the sole source of explanatory power.

Turning first to Rae's approach of taking each election outcome as

[11]Also, if we regress *ENPV*, *ENPS*, *NV*, and *NS* on $\ln(D_e)$ alone rather than $H^*\ln(D^e)$, adjusted R^2's decline to .18, .29, .30, and .23.

regressions 1 and 3, we see that although the coefficient on $\ln(D)$ in regression 1 is significant and nearly identical to that on $H^*\ln(D)$ in regression 3, multiplying $\ln(D)$ in regression 4 by the effective number of ethnic groups increases the fit of our model appreciably. Thus, although the qualitative conclusion that district magnitude has an important influence on the number of parties does not change with how $\ln(D)$ is entered into a regression, the important fact is that its effect is best described by treating it as a variable that intervenes interactively between ethnic heterogeneity and the effective number of parties.

Countries and Time Period

What we must now do is ascertain the robustness of this finding against various things, including: (1) the countries and election periods under consideration; (2) the method of counting the number of parties; and (3) alternative measures of district magnitude. First, then, accepting the possibility that averages across regimes admit of too many out-of-equilibrium elections, consider the first three regressions in Table 2, which parallel regressions 3–5 in Table 1, except that now we (1) extend the time period to 1990; (2) add the data from Japan, Spain, Portugal, and Greece; (3) delete those regimes that contain only one election; and (4) take only the last election in each regime as the observation corresponding to that regime. Although we are no longer averaging variables within regimes, statistical relationships are a bit stronger—at least with respect to regressions 5 and 6 as compared to regressions 2 and 3.

Counting Parties

Now let us consider other operationalizations of "number of parties." Table 2 reports the results of a series of regressions in which the effective number of parties is calculated using their relative share of seats (*ENPS*); here also are the results for dependent variables corresponding to a simple count of the number of parties that receive at least 1% of the vote in two or more successive elections (*NV*) or that secure one or more seats in at least two successive elections (*NS*).

The regressions this table reports warrant at least three comments. First, *an interactive relation remains superior to a simple linear additive one regardless of our choice of dependent variable*. Thus, our conclusion about how heterogeneity ought to be entered into the analysis—as a variable that mediates the influence of district magnitude—is invariant with how we count parties. Second, the best overall fit occurs when we use a simple count (*NV* or *NS*) rather than a calculation of "effective number." Our final comment concerns the explanatory power gained by adding H and $\ln(D)$ to $H^*\ln(D)$—regressions run in accordance with

expression (3). Although regression pairs (7, 8), (10, 11), (13, 14), and (16, 17) each provide essentially the same goodness of fit, a simple regression using $H^*\ln(D)$ does in fact perform best in the case of simple counts of parties. An appeal to parsimony and the elimination of variables with insignificant coefficients, then, dictates the choice of the simplest regression, expression (2).[10]

District Magnitude

Table 2 gives us confidence that our conclusion about the superiority of an interactive model is robust to manipulations in the countries and time period considered and to the operationalization of our dependent variable. But we should also consider alternative measures of district magnitude, since no single measure can capture all of the variation in elec-

[10]We focus on ethnicity because we have more confidence in its measurement and incorporation into a fractionalization index. Nevertheless, using *ENPV* and *NV* as dependent variables, the following regressions parallel regression sets {6, 7} and {12, 13} except that language and religious fractionalization are used to calculate heterogeneity: H_l and H_r, respectively. First, with respect to linguistic fractionalization,

$$\begin{aligned} ENPV &= \underset{(3.0)}{2.00} + \underset{(3.3)}{.39\ln(D)} + \underset{(1.7)}{0.9H_l}; & R^2 &= .21 \\ ENPV &= \underset{(15.3)}{3.23} + \underset{(3.0)}{.29H_l^*\ln(D)}; & R^2 &= .19 \\ NV &= \underset{(2.6)}{2.71} + \underset{(5.7)}{1.0\ln(D)} + \underset{(1.4)}{1.11H_l}; & R^2 &= .32 \\ NV &= \underset{(11.9)}{4.36} + \underset{(5.9)}{.68H_l^*\ln(D)}; & R^2 &= .34. \end{aligned}$$

Thus, linguistic heterogeneity generates results that are nearly equivalent to those generated by ethnic heterogeneity with both R^2 and the magnitude of coefficients being statistically similar. However, if we ignore the issue of whether the differences are statistically significant, ethnicity does provide the better fit. Next, with respect to religious heterogeneity,

$$\begin{aligned} ENPV &= \underset{(8.8)}{3.39} + \underset{(3.2)}{.38\ln(D)} - \underset{(-0.7)}{.08H_r}; & R^2 &= .13 \\ ENPV &= \underset{(16.4)}{3.49} + \underset{(2.3)}{.15H_r^*\ln(D)}; & R^2 &= .12 \\ NV &= \underset{(7.9)}{4.90} + \underset{(5.4)}{.93\ln(D)} - \underset{(-1.8)}{0.30H_r}; & R^2 &= .31 \\ NV &= \underset{(12.5)}{5.01} + \underset{(2.7)}{.33H_r^*\ln(D)}; & R^2 &= .19. \end{aligned}$$

So religion produces fits that are uniformly inferior to those of language and ethnicity; indeed, in a simple linear model (not reported here), the coefficient on religion has the wrong and insignificant sign. This finding, though, is not surprising if religion is subject to the inherent ambiguity of how people choose to report weak or nonexistent affiliations.

Table 3. "Effective" District Magnitude

Regression Numbers	Dependent Variable	Constant	$\ln(D_e)$	H	$H^*\ln(D_e)$	Adj. R^2	SEE (Mean)
16	*ENPV*	2.06	.54	.48	—	.22	1.17
		(3.3)	(4.3)	(1.43)			(3.90)
17	*ENPV*	2.73	—	—	.45	.37	1.05
		(13.1)			(4.89)		
18	*ENPV*	2.94	−.46	−.34	.75	.39	1.03
		(7.89)	(−1.6)	(−.28)	(3.24)		
19	*ENPS*	1.69	.57	.35	—	.31	1.02
		(3.12)	(5.49)	(1.17)			(3.40)
20	*ENPS*	2.21	—	—	.46	.45	.91
		(13.5)			(6.14)		
21	*ENPS*	2.41	−.25	−.07	.61	.44	.92
		(7.47)	(−.90)	(−.61)	(2.88)		
22	*NV*	2.83	1.32	.71	—	.33	2.28
		(2.53)	(4.5)	(1.37)			(6.65)
23	*NV*	3.89	—	—	1.05	.47	2.03
		(8.77)			(5.69)		
24	*NV*	4.41	−.48	−.21	1.36	.45	2.06
		(5.06)	(−.91)	(−.78)	(3.48)		
25	*NS*	2.86	1.37	.79	—	.23	2.97
		(2.05)	(3.94)	(1.14)			(6.88)
26	*NS*	3.93	—	—	1.12	.36	2.67
		(7.18)			(5.23)		
27	*NS*	4.81	−.86	−.35	1.67	.36	2.69
		(4.63)	(−1.2)	(−1.2)	(3.18)		

$N = 52$

Table 4. Election-by-Election Data, Full Sample

Regression Numbers	Dependent Variable	Constant	ln(D)	H	H*ln(D)	Adj. R^2	SEE (Mean)
28	*ENPV*	2.68	.55	.11	—	.33	1.00
		(18.9)	(13.8)	(1.6)			(3.70)
29	*ENPV*	2.88	—	—	.41	.38	0.97
		(49.4)			(14.1)		
30	*ENPV*	3.08	−0.05	−0.11	.44	.38	0.97
		(25.6)	(−0.4)	(−2.4)	(4.18)		
31	*ENPS*	2.36	.57	.04	—	.40	0.92
		(18.6)	(16.0)	(0.7)			(3.32)
32	*ENPS*	2.48	—	—	.43	.43	0.90
		(49.7)			(15.9)		
33	*ENPS*	2.69	.07	−0.14	0.36	.43	0.90
		(25.6)	(0.6)	(−3.2)	(3.83)		
34	*NV*	3.31	1.38	.29	—	.50	1.89
		(12.1)	(17.1)	(2.44)			(5.88)
35	*NV*	3.90	—	—	1.00	.50	1.83
		(32.6)			(18.3)		
36	*NV*	4.07	.24	−0.13	0.83	.51	1.82
		(16.5)	(1.10)	(−1.4)	(5.07)		
37	*NS*	2.58	1.67	.54	—	.47	2.23
		(8.64)	(18.5)	(3.97)			(5.98)
38	*NS*	3.62	—	—	1.20	.51	2.16
		(28.7)			(20.3)		
39	*NS*	3.46	.34	.05	0.97	.51	2.16
		(13.0)	(1.22)	(0.54)	(4.81)		

N = 453

an independent observation, Table 4 offers the relevant regressions, and once again offers a comparison of additive and interactive models for the alternative dependent variables. Perhaps the most important fact to be gleaned from these regressions is that our qualitative conclusion is once again sustained—the interactive model performs better than a linear additive one. Not only does Table 4 repeat the pattern of better overall fits for the interactive model than the simple additive one, regardless of dependent variable, but the use of $H^*\ln(D)$ generates an improvement in fit over the use of $\ln(D)$ alone—R^2's increase from .33, .40, .42, and .44 to .38, .43, .50, and .51. Moreover, neither $\ln(D)$ nor H is significant when included with $H^*\ln(D)$ (regressions 30, 33, 36, 39), which once again supports expression (2) as the best overall model.

Aside from the fact that R^2's are higher in Table 4 than in Table 3 (which is to be expected because of the greater number of observations—453 versus 52), the only difference of note is that the coefficients on $\ln(D)$ are significant everywhere and on H when NV and NS are the dependent variables (see regressions 28, 31, 34, 37). However, when the interactive model is considered, the similarities between Tables 3 and 4 in the magnitudes of coefficients are more remarkable. Looking at the coefficient on $H^*\ln(D)$, if we use Lijphart's regime approach, we get .45, .46, 1.05, and 1.12 for each of the four dependent variables (regressions 17, 20, 23, 26), whereas if we use election-by-election data we get .41, .43, 1.00, and 1.20 (regressions 30, 32, 34, and 36). Thus, once heterogeneity is appropriately factored into the analysis, there is no reason to modify Rae's original conclusions about the influence of district magnitude or to argue that district magnitude has a different influence on party systems when regimes rather than individual elections are taken as the unit of analysis.

5. PR Systems Only

The last issue we want to address concerns the extent to which our results are driven by the fact that the most heterogeneous states on average are those with single-member districts and with the fewest number of parties. Specifically, those countries with single-member district regimes—the United States, Canada, Australia, Great Britain, New Zealand, and France—are, on average, more heterogeneous than their proportional representation counterparts (with an average fractionalization score of .40 versus .15 in the 1960 ethnic data and .50 versus .21 in the 1985 data) and are associated, on average, with lower values of $ENPV$ (2.98 versus 4.48 for the most recent regime). The particular hypothesis we want to examine is Taagepera and Shugart's (1989, 142) assertion that "the decisive question is not whether a particular system is plurality or PR, but what its effective magnitude is."

Focusing on NV alone, since this is sufficient to establish our conclusions, Table 5 reports the results of a series of regressions using expressions (1), (2), and (3) again as our models. The thing to notice first is that goodness of fit as measured by R^2 between the linear and interactive specifications (expressions 1 and 2, narrows or disappears altogether so that the apparent advantage of the interactive model over the additive model disappears in PR systems. That is, contrary to Taagepera and Shugart's argument, the superiority of the interactive model appears to derive solely from the fact that single-member district states not only have fewer parties on average but also are more heterogeneous than their PR counterparts.

Nevertheless, there are reasons for preferring the hypothesis that district magnitude is best modeled as an intervening variable. Let us look first at the intercept terms. If we use the interactive model, then the average absolute difference between the value of this term between the complete and partial data sets is .04 and .22; but if we use the additive model, this difference is 2.21 and 1.21 for the regime and election-by-election data, respectively. (Also, notice that the intercept terms in regressions 40 and 43 are simply too low—indeed, the constant in 40 is not even significantly different from zero.) Similarly, while the coefficient on $\ln(D)$ when used in the additive model varies on average by .12 and .17 in the two data sets, the coefficient on $H^*\ln(D)$ varies by .01 and .06. Thus, the interactive model offers estimated coefficients that are far less sensitive to the treatment of the data.

Looking next at the regressions corresponding to expression (3)—regressions 42 and 45—notice that no coefficient is significantly different from zero, which, when compared to the other regressions in this table, suggests significant multicollinearity. Of course, multicollinearity in this instance stems from the fact that H plus $\ln(D)$ "explains" the data in much the same way as does $H^*\ln(D)$ if systems in which $\ln(D) = 0$ are excluded. But if it follows, say, Lewis-Beck's (1977) treatment of this problem by dropping either $\ln(D)$ or H from the regression, we find that neither the coefficient for H nor the one for $\ln(D)$ becomes significant, whereas the remaining coefficients and measures of goodness of fit are much like the ones regressions 41 and 44 report.[12] Thus, once we control

[12]For the regime data, the regressions in question are

$$NV = \underset{(4.58)}{4.15} + \underset{(.11)}{.06}\ln(D) + \underset{(2.52)}{1.06}H^*\ln(D); \quad R^2 = .41$$

$$NV = \underset{(4.06)}{3.90} + \underset{(.32)}{.34}H + \underset{(2.61)}{1.05}H^*\ln(D); \quad R^2 = .41$$

whereas for the election-by-election data, they are

Table 5. PR Systems Only

Regression Numbers	Constant	ln(D)	H	H*ln(D)	Adj. R^2	SEE (Mean)
Regime data: (n = 40)						
40	1.08	1.39	2.49	—	.44	1.96
	(0.82)	(3.30)	(3.31)			(7.38)
41	4.19	—	—	1.10	.43	1.98
	(4.07)			(3.47)		
42	−2.42	3.10	5.31	−1.37	.43	1.97
	(−.45)	(1.18)	(1.11)	(−.59)		
Election-by-election data: (n = 318)						
43	2.10	1.21	1.59	—	.37	1.92
	(4.71)	(11.0)	(4.88)			(6.77)
44	4.12	—	—	.94	.37	1.92
	(18.2)			(11.5)		
45	3.31	.60	.55	.51	.37	1.92
	(1.85)	(.69)	(.35)	(.66)		

Note: Dependent variable = *NV*.

for $H^*\ln(D)$, neither H nor $\ln(D)$ alone has any significant explanatory power.

There are some things, however, that do not change when we delete single-member district systems from the sample. First, although we do not report the regressions here, better fits continue to be secured when parties are simply counted rather than computed on the basis of a fractionalization index. Thus, a simple count is not only the more behaviorally meaningful dependent variable but also is the more predictable measure of number of parties, regardless of whether we include single-member district systems. Second, the estimated coefficients for $H^*\ln(D)$ do not change dramatically—to .32, .27, 1.10, and 1.33 from .37, .38, 1.09, and 1.21 for the regime data and to .34, .33, .94, and 1.24 from .41, .43, 1.00, and 1.20 with the election-by-election data (for *ENPV*, *ENPS*, *NV*, and *NS*, respectively, as dependent variables). And once again, we can see that these numbers show a considerable stability across alternative treatments of the data.

Overall, much of the evidence in favor of an interactive model does derive from the character of single-member district states. However, we cannot be altogether indifferent between models even if we restrict our attention to PR systems. Considerations like parsimony, the stability of coefficients, and the theoretical meaningfulness of estimated coefficients lead us to prefer estimations in the form of expression (2) over expressions (1) and (3). And although we can reason that the choice between single-member and multimember district systems is a qualitative one that entails other decisions such as the weight that ought to be given to achieving proportional representation in some form, analyzing the effects of district magnitude can proceed under Taagepera and Shugart's (1989) argument that single-member district systems are quantitatively but not qualitatively different from their multimember district counterparts.

6. Conclusion

There are many things this essay does not consider, such as the influence of seat allocation formulas and ballot structure (Rae 1971; Lijphart

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$$NV = 3.97 + .29\ln(D) + .77H^*\ln(D); \quad R^2 = .37$$
$$\quad\quad (16.2)\ (1.38)\quad\quad (4.85)$$
$$NV = 4.52 - .44H + 1.00H^*\ln(D); \quad R^2 = .37$$
$$\quad\quad (11.2)\ (-1.1)\ (10.1)$$

The test for multicollinearity proposed by Belsley, Kuh, and Welsch (1980) indicates significant multicollinearity in both restricted (PR-only) data sets when H, $\ln(D)$, and $H^*\ln(D)$ are employed simultaneously. There is no multicollinearity, on the other hand, when only any two of these variables is included; and there is no multicollinearity when the full sample is analyzed.

1990), vote thresholds (Taagepera and Shugart 1989), the influence of presidential versus parliamentary systems (Jones 1992a, 1992b; Shugart and Carey 1992), and the nature of federal institutions and the territoriality of ethnicity (Horowitz 1991; Lijphart 1977, 1984). And as we note earlier, we also fail to consider district magnitude itself as an endogenously determined parameter chosen to achieve certain ends in the context of a particular environment (Shamir 1985). To the extent that H influences D, our approach probably overstates district magnitude's mediating influence while it understates the role of ethnic heterogeneity.

Unfortunately, sorting out the interdependencies among social structure, electoral laws, and outcomes requires a firmer theoretical footing than is available. An empirical investigation uninformed by rigorously derived theoretical relationships is unlikely to yield definitive conclusions. Nevertheless, with this caveat in mind, we can conclude that any general theoretical model should accommodate the fact that if the effective number of ethnic groups is large, political systems become especially sensitive to district magnitude. But if ethnic fractionalization is low, then only especially large average district magnitudes result in any "wholesale" increase in formally organized parties. Finally, if district magnitude equals one, then the party system is relatively "impervious" to ethnic and linguistic heterogeneity (keeping in mind, of course, that this conclusion rests on data from one source—stable, economically prosperous Western democracies).

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